

New Jersey Department of Environmental Protection
 Division of Air Quality
 Bureau of Air Quality Evaluation

REFERENCE CONCENTRATIONS FOR INHALATION
 September 2005

	HAP	CAS No.	Chemical Name	Reference Concentration ($\mu\text{g}/\text{m}^3$)	Reference	Comment
1	*	75070	Acetaldehyde	9	IRIS	
2		67641	Acetone	31000	ATSDR 04	See comment 1.
3		75865	Acetone cyanohydrin	10	HEAST 97	
4	*	75058	Acetonitrile	60	IRIS	
5	*	98862	Acetophenone	0.02	HEAST 92	
6	*	107028	Acrolein	0.02	IRIS	
7	*	79107	Acrylic acid	1	IRIS	
8	*	107131	Acrylonitrile	2	IRIS	
9	*	107051	Allyl chloride	1	IRIS	
10		7664417	Ammonia	100	IRIS	
11	*	62533	Aniline	1	IRIS	
12	**	1309644	Antimony trioxide	0.2	IRIS	
13	*		Arsenic and compounds	0.03	Cal 05a	
14	**	7784421	Arsine	0.05	IRIS	
15	*	71432	Benzene	30	IRIS	
16	*		Beryllium	0.02	IRIS	
17	*	117817	Bis(2-ethylhexyl)phthalate	70	Cal 05a	DEHP
18		7440428	Boron (elemental)	20	HEAST 97	
19		7637072	Boron trifluoride	0.7	HEAST 97	
20	*	106990	Butadiene (1,3-)	2	IRIS	
21	*		Cadmium and compounds	0.02	Cal 05a	
22	*	75150	Carbon disulfide	700	IRIS	
23	*	56235	Carbon tetrachloride	40	Cal 05a	
24	*	57749	Chlordane (technical)	0.7	IRIS	Also CAS 12789036
25	*	7782505	Chlorine	0.2	Cal 05a	
26		10049044	Chlorine dioxide	0.2	IRIS	
27	*	532274	Chloroacetophenone (2-)	0.03	IRIS	
28	*	108907	Chlorobenzene	1000	Cal 05a	
29		75683	Chloro-1,1-difluoroethane (1-)	50000	IRIS	HCFC-142b
30		75456	Chlorodifluoromethane	50000	IRIS	HCFC-22
31		76062	Chloropicrin	0.4	Cal 05a	
32	*	126998	Chloroprene	1	Cal 05b	2-Chloro-1,3-butadiene
33		75296	Chloropropane (2-)	100	HEAST 97	
34	**		Chromic acid mists (Cr VI)	0.008	IRIS	
35	**		Chromium VI dissolved aerosols	0.008	IRIS	
36	**		Chromium VI particulates	0.1	IRIS	
37	*		Cobalt	0.005	Cal 97	
38			Copper	2.4	Cal 05b	
39	*	1319773	Cresol mixtures	600	Cal 05a	
40		98828	Cumene	400	IRIS	
41	*	96128	Dibromo-3-chloropropane (1,2-)	0.2	IRIS	
42		95501	Dichlorobenzene (1,2-)	200	HEAST 97	
43	*	106467	Dichlorobenzene (1,4-)	800	IRIS	
44		75718	Dichlorodifluoromethane	200	HEAST 97	
45	*	542756	Dichloropropene (1,3-)	20	IRIS	
46	*	62737	Dichlorvos	0.5	IRIS	
47		77736	Dicyclopentadiene	0.2	HEAST 97	
48			Diesel engine emissions	0.5	IRIS***	***See comment 2.
49	*	111422	Diethanolamine	3	Cal 05a	

	HAP	CAS No.	Chemical Name	Reference Concentration (ug/m ³)	Reference	Comment
50	*	112345	Diethylene glycol monobutyl ether	20	HEAST 97	
51		75376	Difluoroethane (1,1-)	40000	IRIS	HCFC-152a
52	*	68122	Dimethylformamide (N,N-)	30	IRIS	
53	*	106898	Epichlorohydrin	1	IRIS	
54	*	106887	Epoxybutane (1,2-)	20	IRIS	
55	*	106934	Ethylene dibromide	0.8	Cal 05a	1,2-Dibromoethane
56	*	107062	Ethylene dichloride	400	Cal 05a	1,2-Dichloroethane
57	*	107211	Ethylene glycol	400	Cal 05a	
58		111762	Ethylene glycol monobutyl ether	13000	IRIS	
59	**	110805	Ethylene glycol monoethyl ether	200	IRIS	2-Ethoxyethanol
60	**	109864	Ethylene glycol monomethyl ether	20	IRIS	2-Methoxyethanol
61	**	110496	Ethylene glycol monomethyl ether acetate	90	Cal 05a	
62	*	75218	Ethylene oxide	30	Cal 05a	
63	*	75343	Ethyldene dichloride	500	HEAST 97	1,1-Dichloroethane
64		16984488	Fluoride	13	Cal 05a	
65	*	50000	Formaldehyde	3	Cal 05a	
66		98011	Furfural	50	HEAST 97	
67			Gasoline vapors	15	NE 89	
68		111308	Glutaraldehyde	0.08	Cal 05a	
69		765344	Glycidaldehyde	1	HEAST 97	
70	*	77474	Hexachlorocyclopentadiene	0.2	IRIS	
71	*	822060	Hexamethylene diisocyanate	0.01	IRIS	
72	*	110543	Hexane (n-)	200	IRIS	
73	*	302012	Hydrazine	0.2	Cal 05a	
74	*	7647010	Hydrogen chloride	20	IRIS	Hydrochloric acid
75	**	74908	Hydrogen cyanide	3	IRIS	
76	*	7664393	Hydrogen fluoride	14	Cal 05a	
77		7783064	Hydrogen sulfide	2	IRIS	
78	*	78591	Isophorone	2000	Cal 05b	
79	*	108316	Maleic anhydride	0.7	Cal 05a	
80	*		Manganese and compounds	0.05	IRIS	
81	*		Mercury (elemental)	0.3	IRIS	
82		126987	Methacrylonitrile	0.7	HEAST 97	
83	*	67561	Methanol	4000	Cal 05a	
84	*	74839	Methyl bromide	5	IRIS	Bromomethane
85	*	74873	Methyl chloride	90	IRIS	Chloromethane
86	*	71556	Methyl chloroform	1000	Cal 05a	1,1,1-Trichloroethane
87		108872	Methylcyclohexane	3000	HEAST 97	
88	*	75092	Methylene chloride	400	Cal 05a	Dichloromethane
89	*	101774	Methylenedianiline (4,4'-)	20	Cal 05a	
90	*	101688	Methylenediphenyl diisocyanate (4,4'-)	0.6	IRIS	
91	*	624839	Methyl isocyanate	1	Cal 05a	
92	*		Methyl mercury	1	Cal 05b	
93	*	80626	Methyl methacrylate	700	IRIS	
94		25013154	Methyl styrene (mixed isomers)	40	HEAST 97	
95	*	1634044	Methyl tert-butyl ether	3000	IRIS	MTBE
96	*		Mineral fibers (<1% free silica)	24	Cal 05b	See comment 3.
97	*	91203	Naphthalene	3	IRIS	
98	*		Nickel and compounds (except NiO)	0.05	Cal 05a	Excludes nickel oxide.
99	**	1313991	Nickel oxide	0.1	Cal 05a	
100	**		Nickel, soluble salts	0.2	TERA 99	See comment 4.
101		88744	Nitroaniline (o-)	0.2	HEAST 97	
102	*	98953	Nitrobenzene	1.7	Cal 05b	
103	*	79469	Nitropropane (2-)	20	IRIS	
104	*	108952	Phenol	200	Cal 05a	
105	*	7803512	Phosphine	0.3	IRIS	

	HAP	CAS No.	Chemical Name	Reference Concentration (ug/m ³)	Reference	Comment
106	*	7664382	Phosphoric acid	10	IRIS	
107	*		Phosphorus (white)	0.07	Cal 05b	
108	*	85449	Phthalic anhydride	20	Cal 05a	
109		115071	Propylene	3000	Cal 05a	
110	*	78875	Propylene dichloride	4	IRIS	1,2-Dichloropropane
111		57556	Propylene glycol	6000	HEAST 91	
112	*	107982	Propylene glycol monomethyl ether	2000	IRIS	
113	*	75569	Propylene oxide	30	IRIS	
114	*		Selenium and compounds	20	Cal 05a	Not hydrogen selenide.
115		7631869	Silica (crystalline, respirable)	3	Cal 05a	
116	*	1004725	Styrene	1000	IRIS	
117		7664939	Sulfuric acid	1	Cal 05a	
118	*	127184	Tetrachloroethylene	35	Cal 05a	Perchloroethylene
119		811972	Tetrafluoroethane (1,1,1,2-)	80000	IRIS	
120	*	7550450	Titanium tetrachloride	0.1	ATSDR 04	
121	*	108883	Toluene	400	IRIS	
122	*	584849	Toluene diisocyanate (2,4-)	0.07	IRIS	
123		91087	Toluene diisocyanate (2,6-)	0.07	IRIS	
124		26471625	Toluene diisocyanate (2,4/2,6-)	0.07	IRIS	Mixture
125	*	120821	Trichlorobenzene (1,2,4-)	200	HEAST 97	
126	*	79016	Trichloroethylene	600	Cal 05a	
127		75694	Trichlorofluoromethane	700	Cal 05b	
128		76131	Trichloro-1,2,2-trifluoroethane (1,1,2-)	30000	HEAST 97	Freon 113
129	*	121448	Triethylamine	7	IRIS	
130	*	108054	Vinyl acetate	200	IRIS	
131	*	593602	Vinyl bromide	3	IRIS	Bromoethene
132	*	75014	Vinyl chloride	100	IRIS	
133	*	75354	Vinylidene chloride	200	IRIS	1,1-Dichloroethylene
134	*		Xylene (m-, o-, p-, or mixed)	100	IRIS	
135			Zinc/zinc oxide	35	Cal 05b	

Note:

All of the reference concentrations are to be compared with long-term (maximum annual average) ambient air concentrations.

HAP – Asterisk (*) indicates that this chemical is on the 1990 Clean Air Act Amendments list of hazardous air pollutants. Double asterisk (**) indicates that this chemical is part of a group listed in the 1990 Clean Air Act Amendments list of hazardous air pollutants (HAPs).

CAS No. - Chemical Abstract Service identification number.

Reference Concentration – An estimate of a continuous inhalation exposure for a given duration to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse health effects over a lifetime (USEPA IRIS, July 2005).

References

- ATSDR 04 Agency for Toxic Substances and Disease Registry, "Minimal Risk Levels (MRLs) for Hazardous Substances," December 2004 (www.atsdr.cdc.gov/mrls.html).
- Cal 97 California Environmental Protection Agency (CalEPA), Determination of Chronic Toxicity Reference Exposure Levels (Draft), October 1997.
- Cal 05a California Office of Environmental Health Hazard Assessment (OEHHA), "All Chronic Reference Exposure Levels Adopted by OEHHA as of February 2005" (www.oehha.ca.gov/air/chronic_rels/AllChrels.html).
- Cal 05b California Air Resources Board (ARB), "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values," updated 4/25/05; (www.arb.ca.gov/toxics/healthval/healthval.htm)
- HEAST 91 U.S. Environmental Protection Agency (USEPA), Health Effects Assessment Summary Tables, Annual FY-1991, January 1991.

HEAST 92	USEPA Health Effects Assessment Summary Tables, Annual Up-date 1992, March 1992.
HEAST 97	USEPA Health Effects Assessment Summary Tables,- FY-1997 Update-, July 1997.
IRIS	USEPA Integrated Risk Information System, as of May 31, 2005 (www.epa.gov/iris).
NE 89	NESCAUM Air Toxics Committee, Evaluation of the Health Effects from Exposure to Gasoline and Gasoline Vapors, August 1989.
TERA 99	Toxicology Excellence for Risk Assessment, Toxicological Review of Soluble Nickel Salts, March 1999.

Comments

1. ATSDR values are "chronic" MRLs, based on an exposure duration of 365 days or longer.
2. The value listed here for diesel engine emissions is actually the IRIS RfC of 5 µg/m³ divided by a safety factor of 10. BAQEV made this adjustment to account for the fact that diesel exhaust is considered "likely to be carcinogenic to humans by inhalation from environmental exposures" (IRIS). IRIS does not have a URF, and the RfC does not take carcinogenicity into account. California's URF is on our list, but not on our risk screening worksheet because it considered to be somewhat uncertain.
3. Specifically, man-made fibers of glasswool, rockwool, slagwool, ceramic, & fine mineral.
4. The following compounds are among those considered to be "soluble nickel salts" (CAS numbers are in parentheses): Ni acetate (373-02-4); Ni acetate tetrahydrate (6018-89-9); Ni ammonium sulfate (7785-20-8); Ni carbonate (333-67-3); Ni chloride (7718-54-9); Ni chloride hexahydrate (7791-20-0); Ni fluoride (10028-18-9); Ni fluoroborate (14708-14-6); Ni formate (3349-06-2); Ni hydroxide (12054-48-7); Ni nitrate (13138-45-9); Ni sulfamate (13770-89-3); Ni sulfate (7786-81-4); Ni sulfate hexahydrate (10101-97-0); Ni sulfide (16812-54-7).